TEST REPORT

Dt&C Co., Ltd.
42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea,17042
Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2404-0046

2. Customer

- Name (FCC) : KC industrial Co.,Ltd.
- Address (FCC) : 19F, 534, Teheran-ro, Gangnam-gu, Seoul South Korea

3. Use of Report : Verification test for simultaneous transmission

4. Product Name / Model Name : UHF RFID READER / R-5710

FCC ID : 2ARHHR5710

5. FCC Regulation(s): Part 15.247

Test Method used: ANSI C63.10-2013, KDB 558074D01v05r02

6. Date of Test : 2024.04.22 ~ 2024.04.23

7. Testing Environment : See appended test report.

8. Test Result : Refer to the attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test report is not related to KOLAS accreditation.

Affirmation	Tested by Name : SeokHo Han	(Signature)	Technical Manager Name : JaeJin Lee	(Signature)

2024 . 04 . 24 .

Dt&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2404-0046	Apr. 24, 2024	Initial issue	SeokHo Han	JaeJin Lee

CONTENTS

1. General Information

1.1 Description of EUT

Product Name	UHF RFID READER	
Model Name	R-5710	
Add Model Name	-	
Power Supply	DC 7.26 V	
Frequency band	RFID_900MHz	902.75 - 927.25 MHz
	Bluetooth LE	2 402 MHz ~ 2 480 MHz
Antenna Specification	RFID_900MHz	Antenna type: CIRCULARLY POLARIZED ANTENNA Gain(Max): 0.00 dBi
	Bluetooth LE	Antenna Type: PCB Antenna Gain(Max): -3.24 dBi

Note: The device contains certified Bluetooth LE module.(FCC ID: SH6MDBT50)

1.2. Declaration by the applicant / manufacturer

N/A

1.3. Testing Laboratory

Dt&C Co., Ltd.		
The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The test site complies with the requirements of Part 2.948 according to ANSI C63.4-2014. **- FCC & IC MRA Designation No. : KR0034** **- ISED#: 5740A**		
www.dtnc.net		
Telephone	:	+ 82-31-321-2664
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1.4. Testing Environment

Ambient Condition	
▪ Temperature	+20 ℃ ~ +21 ℃
▪ Relative Humidity	+40 % ~ +41 %

1.5. Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C63.4-2014 and ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

Test items	Measurement uncertainty
Radiated spurious emission (1 GHz Below)	5.0 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz ~ 18 GHz)	4.8 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (18 GHz Above)	5.0 dB (The confidence level is about 95 %, k = 2)

1.6. Test Equipment List

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	N9020A	23/12/15	24/12/15	MY50110097
Thermohygrometer	BODYCOM	BJ5478	23/12/15	24/12/15	120612-2
Multimeter	FLUKE	17B+	23/12/15	24/12/15	36390701WS
Signal Generator	Rohde Schwarz	SMBV100A	23/12/15	24/12/15	255571
Signal Generator	ANRITSU	MG3695C	23/12/15	24/12/15	173501
Loop Antenna	ETS-Lindgren	6502	23/11/09	24/11/09	00060496
Hybrid Antenna	Schwarzbeck	VULB 9160	23/12/15	24/12/15	3362
Horn Antenna	ETS	3117	23/12/15	24/12/15	00140394
Horn Antenna	A.H.Systems	SAS-574	23/06/23	24/06/23	155
PreAmplifier	Agilent	8449B	23/12/15	24/12/15	3008A02108
PreAmplifier	H.P	8447D	23/12/15	24/12/15	2944A07774
PreAmplifier	tsj	MLA-1840-J02-45	23/06/23	24/06/23	16966-10728
Band Reject Filter	Wainwright Instruments	WRCT800/960.0-2/40-8SSK	23/06/23	24/06/23	32
High-pass filter	Wainwright	WHKX12-935-1000-15000-40SS	23/12/15	24/12/15	7
High-pass filter	Wainwright	WHKX10-2838-3300-18000-60SS	23/12/15	24/12/15	2
High-pass filter	Wainwright	WHKX6-6320-8000-26500-40CC	23/12/15	24/12/15	2
Cable	HUBER+SUHNER	SUCOFLEX100	24/01/03	25/01/03	M-1
Cable	HUBER+SUHNER	SUCOFLEX100	24/01/03	25/01/03	M-2
Cable	Junkosha	MWX241/B	24/01/03	25/01/03	M-3
Cable	Junkosha	MWX221	24/01/03	25/01/03	M-4
Cable	Junkosha	MWX221	24/01/03	25/01/03	M-5
Cable	JUNFLON	J12J101757-00	24/01/03	25/01/03	M-7
Cable	HUBER+SUHNER	SUCOFLEX104	24/01/03	25/01/03	M-8
Cable	HUBER+SUHNER	SUCOFLEX106	24/01/03	25/01/03	M-9
Cable	Junkosha	MWX315	24/01/03	25/01/03	M-10
Cable	DTNC	Cable	24/01/03	25/01/03	RFC-69
Cable	Junkosha	MWX241	24/01/03	25/01/03	mmW-1
Cable	Junkosha	MWX241	24/01/03	25/01/03	mmW-4
Test Software	tsj	Radiated Emission Measurement	NA	NA	Version 2.00.0185

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.
Note2: The cable is not a regular calibration item, so it has been calibrated by Dt&C itself.

2. Test Methodology

The measurement procedures described in the ANSI C63.10-2013 was used in measurement of the EUT.

2.1. EUT configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT exercise

The EUT was operated in the test mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

2.3. General test procedures

Radiated Emissions

The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through three orthogonal axes.

2.4. Description of test modes

The EUT configured for simultaneous transmission in the following mode of operation;

-	Technology	Mode	TX Frequency
Transmitting Configuration	Bluetooth LE	Typical operation	2402 ~ 2480 MHz
	900 MHz Band RFID	Continuous transmission	915.25 MHz

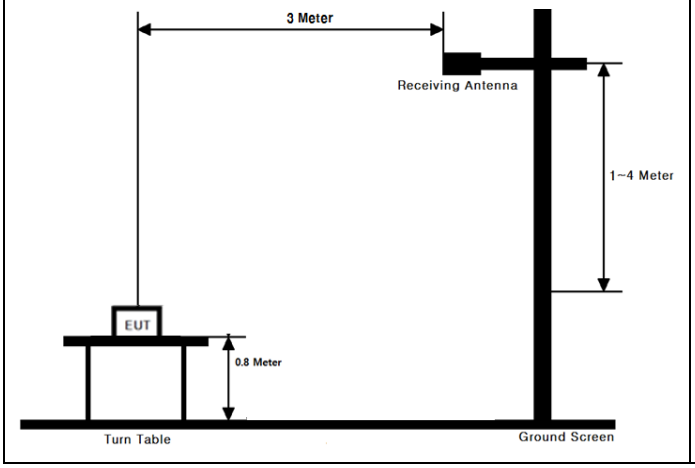
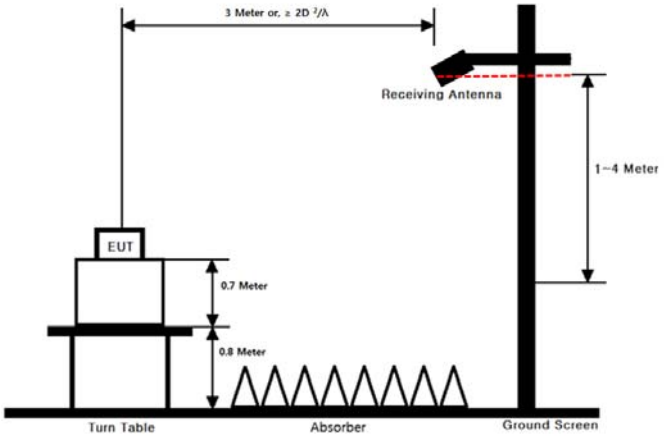
3. Summary of Test Results

FCC Part	Test Description	Limit	Test Condition	Status Note 1
15.247(d) 15.205 15.209	Unwanted Emissions(Radiated)	FCC 15.209 Limits	Radiated	C

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

4. Unwanted Emissions (Radiated)

▣ Test Configuration

Below 1GHz	Above 1GHz
	

▣ Test Procedure

ANSI C63.10-2013 – Section 9.12, 9.13

The following procedure was used for measurement of the radiated spurious emissions.

1) The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements at above 1 GHz, the table height is 1.5 m

2) The table was rotated 360 degrees to determine the position of the highest radiation.

3) During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 0.5 ~ 3 meter away from the interference-receiving antenna.

4) For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

5) The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

6) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

7) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

- Spectrum analyzer settings:

1. Frequency Range: Below 1 GHz
RBW = 100 or 120 kHz, VBW = 3 x RBW, Detector = Peak or Quasi Peak

2. Frequency Range: 1 ~ 25 GHz
Peak Measurement
RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Sweep time = Auto, Trace mode = Max Hold until the trace stabilizes

Average Measurement> 1GHz
RBW = 1MHz, VBW = Reduce the video bandwidth until no significant variations in the displayed signal are observed in subsequent traces, provided the video bandwidth is no less than 1 Hz. (Actual VBW setting: 30Hz)

▣ Test Results: Comply

▪ **Note.**

1. The radiated emissions below 1GHz were investigated 9 kHz to 1 GHz and the worst case data was reported.
2. Information of Distance Correction Factor
   For finding emissions, measurements may be performed at a distance closer than that specified in the regulations.
   In this case, the distance factor is applied to the result.
   - Calculation of distance correction factor
   At frequencies below 30 MHz = 40 log(tested distance / specified distance)
   At frequencies at or above 30 MHz = 20 log(tested distance / specified distance)
   When distance factor is “N/A”, the measurements were performed at the specified distance and distance factor is not applied.
3. Sample Calculation.
   Margin = Limit – Result / Result = Reading + TF+ DCCF + DCF / TF = AF + CL + BL + AL – AG
   Where, TF = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain, BL = Band reject filter Loss, AL = Attenuator Loss,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor

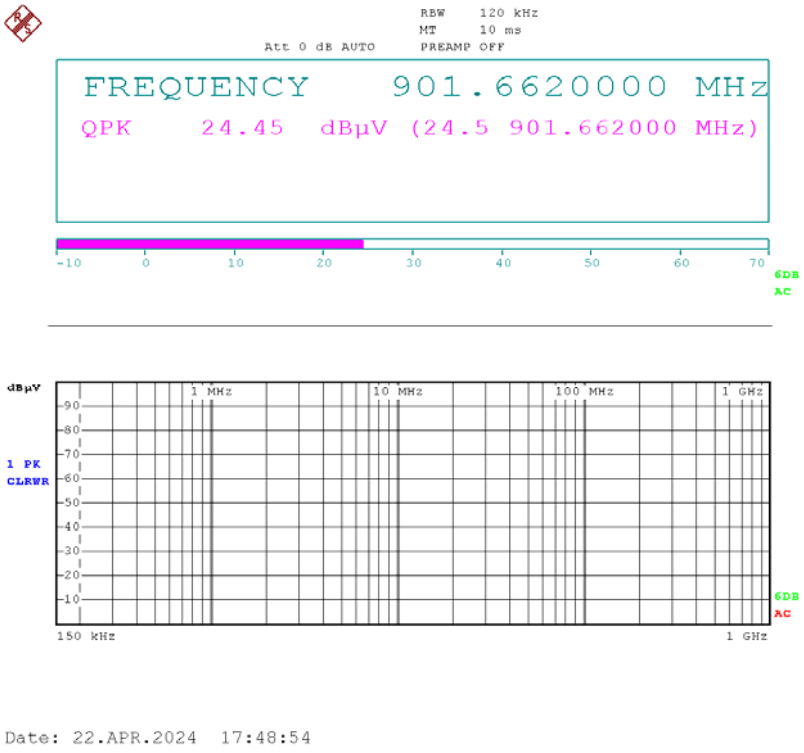
Frequency Range : 9 KHz ~ 1 GHz

▪ Bluetooth LE + RFID_915.25 MHz

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
901.66	H	X	QP	24.50	7.69	N/A	N/A	32.19	46.02	13.83
946.29	H	X	QP	23.10	8.69	N/A	N/A	31.79	46.02	14.23
954.24	V	X	QP	23.10	8.82	N/A	N/A	31.92	46.02	14.10
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Worst-case plot **X axis & Hor**

Detector Mode : QP



▪ **Note.**

1. The radiated emissions above 1GHz were investigated up to 25GHz.
   And no other spurious and harmonic emissions were found above listed frequencies.
2. Information of Distance Correction Factor
   For finding emissions, measurements may be performed at a distance closer than that specified in the regulations.
   In this case, the distance factor is applied to the result.
   - Calculation of distance correction factor
   At frequencies below 30 MHz = 40 log(tested distance / specified distance)
   At frequencies at or above 30 MHz = 20 log(tested distance / specified distance)
   When distance factor is “N/A”, the measurements were performed at the specified distance and distance factor is not applied.
3. Sample Calculation.
   Margin = Limit – Result / Result = Reading + TF+ DCCF + DCF / TF = AF + CL + HL + AL – AG
   Where, TF = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain, HL = High Pass filter Loss, AL = Attenuator Loss,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor

Frequency Range : 1 GHz ~ 25 GHz

▪ Bluetooth LE + RFID_915.25 MHz

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	TF (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2 745.81	V	Z	PK	48.76	3.98	N/A	N/A	52.74	74.00	21.26
2 745.77	V	Z	AV	43.98	3.98	N/A	N/A	47.96	54.00	6.04
3 660.99	V	Y	PK	46.85	6.24	N/A	N/A	53.09	74.00	20.91
3 661.04	V	Y	AV	40.87	6.24	N/A	N/A	47.11	54.00	6.89
4 576.14	H	Y	PK	47.20	7.73	N/A	N/A	54.93	74.00	19.07
4 576.25	H	Y	AV	42.67	7.73	N/A	N/A	50.40	54.00	3.60
7 322.09	V	Z	PK	45.35	11.17	N/A	N/A	56.52	74.00	17.48
7 321.99	V	Z	AV	39.96	11.17	N/A	N/A	51.13	54.00	2.87
8 237.28	H	Y	PK	38.98	12.90	N/A	N/A	51.88	74.00	22.12
8 237.29	H	Y	AV	29.70	12.90	N/A	N/A	42.60	54.00	11.40
9 152.34	H	Y	PK	40.73	13.77	N/A	N/A	54.50	74.00	19.50
9 152.41	H	Y	AV	31.42	13.77	N/A	N/A	45.19	54.00	8.81

Worst-case plot Z axis & Ver